

Onychoscopy in the diagnosis of the distal subungual onychomycosis and traumatic onycholysis

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Abstract

Aim: Distal subungual onychomycosis is a common public health problem which composes a large part of nail diseases. The exact diagnosis of the disease is often unfeasible without mycological investigations.

In this study, we aimed to reveal sensitivity and specificity of previously described onychoscopic (nail dermoscopic) features that support and facilitate diagnosis of distal subungual onychomycosis.

Material and Methods: Big toe nail of 53 patients who present with distal onycholysis were examined by digital dermatoscopy and were photographed. Specific dermatoscopic features were recorded. Mycological investigations were performed in all patients and dermatoscopic diagnosis was compared with mycological diagnosis. Three patients were excluded from the study whose final diagnoses were psoriasis.

Results: Two specific findings previously described as longitudinal stria and spike were obtained as a result of examination of the dermatoscopic imaging. Sensitivity and specificity of longitudinal stria sign was found as 75.7% and 88.2% respectively. Sensitivity and specificity of spike sign was found as 57.5% and 94.1% respectively. And finally sensitivity and specificity of the presence of at least one of the two signs was found as 96,9% and 88,2%, respectively.

Conclusion: Dermoscopic examination is very useful and cost-effective method in diagnosis of the distal subungual onychomycosis

Keywords: Dermatoscopy; Onychomycosis; Traumatic Onycholysis.

INTRODUCTION

Onychomycosis is the most common nail disorder which is described as fungal infection of the nail (1). The prevalence of the disease has been reported to be 23% in Europe (2) and 20% in East Asia (3). Onychomycosis is considered in 5 clinical subtypes: distal subungual onychomycosis, proximal subungual onychomycosis, endonyx onychomycosis, white superficial onychomycosis and total dystrophic onychomycosis (4). Distal subungual onychomycosis (DSO) affects nail bed, nail plate and hyponychium. The source of the infection is usually considered to be tinea pedis and the most common form of the DSO is distal lateral subungual onychomycosis (DLSO) (1). There are many methods for diagnosis of the onychomycosis like direct microscopic examination with potassium hydroxide (KOH) preparation, culture, nail plate biopsy using periodic acid-Schiff (PAS) stain and rarely polymerized chain reaction (PCR) (5,6).

Dermatoscopy is a widely used noninvasive method in the diagnosis of many dermatological diseases. However,

nail dermatoscopy also known as "onychoscopy" is a rather new method in the diagnosis of nail disorders and was used in the diagnosis of nail pigmentation firstly (7). Later on, it became a widely used tool in the diagnosis of neoplastic and non-neoplastic nail diseases.

In our study, we aimed to reveal specific dermatoscopic findings which facilitate diagnosis of the DSO cases and to reveal the sensitivity and specificity of the dermatoscopic features which distinguish DSO from other nail disorders such as traumatic onycholysis where mycological examinations are negative. The reason for choosing DSO cases here is that DSO is the most common form of onychomycosis. We also chose only big toe localized cases to standardized the study.

MATERIAL and METHODS

The study was performed at dermatology department of the Erzurum Ataturk University, Medical Faculty. 50 patients were included to the study which are considered to have distal subungual onychomycosis or another cause

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of onycholysis clinically. The affected big toe nail of all the patients were examined and photographed with digital dermatoscopy (FotoFinder® dermoscope, FotoFinder Systems GmbH, Bad Birnbach, Germany) and the findings were recorded.

A scraping material was received from the nail with using a blunt scalpel and the material was placed in a slide, a few drops of 20% potassium hydroxide (KOH) was added and sealed with a coverslip. Thereafter, it was left in a petri dish containing moist drying paper for about 40 minutes to 1 hour. A direct microscopic examination was made with x10 objective and then with x40 objective in the light microscope. The result was accepted as positive if any hypha, spores or yeast were observed.

Another scraping material was also taken from the subungual area for mycological culture. The material was planted on a glucose agar of Saboraud containing cycloheximide and antibiotic. The material was incubated at room temperature for 3 weeks. At the end of incubation, type identification was performed for the cultures in which fungal growth was detected.

Patients were grouped by age and gender. The sensitivity and specificity of the dermatoscopic findings were determined with comparing by direct microscopic examination and culture results. Statistical evaluation was performed by Chi-square test using SPSS Statistics 20.0© software and $p < 0.001$ was considered statistically significant.

RESULTS

The big toe nails of 53 patients were evaluated dermatoscopically. Three patients with definite psoriatic nail involvement were excluded from the study.

Twenty eight of the patients were males and 22 were females. (Mean age 49.52 ± 13.72 , age range 23-80)

All of the patients had distal onycholysis and varying degrees of subungual hyperkeratosis. The duration of the disease varied from 1 to 4 years. The average duration was 5 months. The cases in which at least one of the KOH or the culture was detected as positive were diagnosed as DSO. After excluding the other possible causes of onycholysis like psoriasis, lichen planus etc., the cases that have negative mycological investigation result along with history of trauma were diagnosed as traumatic onycholysis.

Thirty out of the 33 cases with definite diagnosis of DSO was KOH positive and 13 were culture positive, 10 were both KOH and culture positive. 33 of the cases were diagnosed with DSO and 17 were diagnosed with TO (Table 1).

After the review of recorded dermatoscopic images, three dermatoscopic findings were detected which were previously described: Spike, longitudinal striae and linear edge.

Spike: The structures extending from the distal edge of the onycholytic area to the proximal nail fold and resembling sawteeth (Figure 1). **Longitudinal stria:** Longitudinal lines with varying colors from white to brown (Figure 2). **Linear edge:** Sharply limited edge which is clearly visible on the proximal border of the onycholytic area (Figure 3).

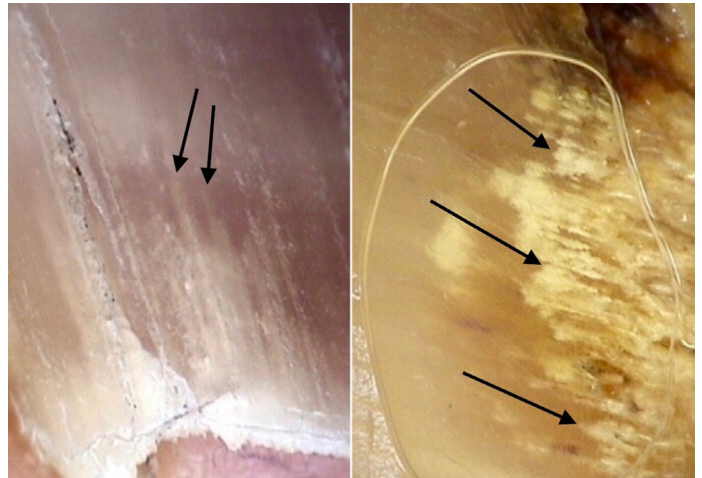


Figure 1. The spike findings



Figure 2. The longitudinal striae findings

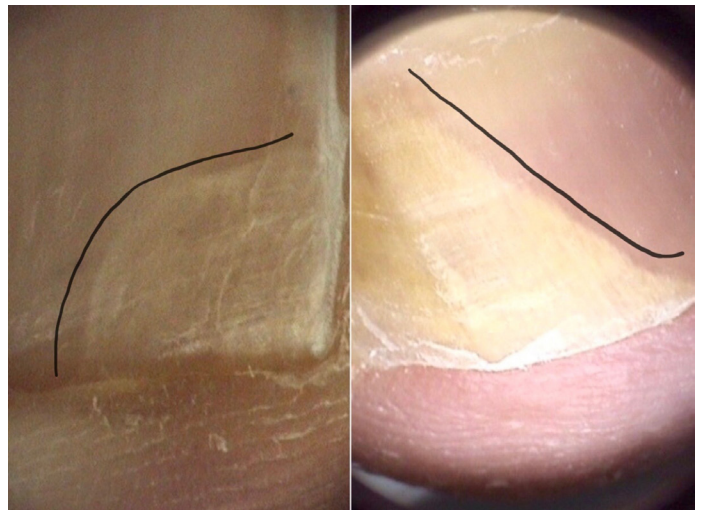


Figure 3. The linear edge findings

After detection of these findings, dermatoscopic features and mycological diagnosis were compared and statistically evaluated. The sensitivity and specificity of the dermatoscopic findings were demonstrated.

The spike finding was found in 19 (57.6%) cases of DSO and in just a case of TO. The sensitivity and specificity of this finding were 57.5% and 94.1% for the diagnosis of DSO, respectively.

The longitudinal striae finding was found in 25 (75.8%) cases of DSO and in just one case of TO. The sensitivity and specificity of this finding were 75.7% and 88.2% for the diagnosis of DSO, respectively. Linear edge finding was observed in all cases with definite diagnosis of TO, except one. This finding was detected in only one definite case of

DSO. The sensitivity and specificity of the linear edge were 94.1% and 96.9% for the diagnosis of TO, respectively.

For the diagnosis of DSO, the sensitivity and specificity of the presence of at least one of the longitudinal stria and spike findings were 96.9% and 88.2%, respectively.

The most common dermatoscopic diagnostic finding

was longitudinal stria. The presence of this finding was statistically significant for DSO when compared with TO ($p < 0.001$). The presence of the spike finding was also statistically significant for DSO when compared with TO ($p < 0.001$).

The linear edge finding was closely related to traumatic onycholysis statistically ($p < 0.001$).

Table 1. Distribution of the cases regarding the age, gender, dermoscopic diagnosis, dermoscopic findings, final diagnosis, KOH examination and culture results

Patient	Age	Gender	Dermoscopic Diagnosis	Final diagnosis	Linear edge	Spike	Stria	KOH	Culture
1	64	K	DSO	DSO	-	-	+	+	-
2	40	E	DSO	DSO	-	-	+	+	T.Rubrum
3	62	E	DSO	DSO	-	-	+	+	-
4	65	E	TO	TO	+	-	-	-	-
5	64	E	DSO	DSO	-	-	+	+	T.Rubrum
6	60	K	DSO	DSO	-	+	+	+	T.Rubrum
7	62	E	TO	TO	+	-	-	-	-
8	48	E	DSO	DSO	-	+	-	+	-
9	54	K	DSO	DSO	-	+	+	+	Candida spp.
10	53	K	TO	TO	+	-	-	-	-
11	27	K	DSO	TO	-	+	+	-	-
12	26	K	TO	TO	+	-	-	-	-
13	72	K	DSO	DSO	-	+	+	+	-
14	53	K	TO	TO	+	-	-	-	-
15	42	K	DSO	DSO	-	-	+	-	Aspergillus spp
16	67	E	TO	TO	+	-	-	-	-
17	61	E	TO	DSO	+	-	-	-	Aspergillus spp
18	49	K	DSO	DSO	-	+	+	+	-
19	28	K	DSO	DSO	-	-	+	+	-
20	48	E	DSO	DSO	-	+	-	+	T. Rubrum
21	49	E	DSO	TO	-	-	+	-	-
22	44	K	TO	TO	+	-	-	-	-
23	28	E	DSO	DSO	-	-	+	+	T.Rubrum
24	26	K	TO	TO	+	-	-	-	-
25	32	E	TO	TO	+	-	-	-	-
26	80	K	DSO	DSO	-	+	+	+	-
27	23	K	TO	TO	+	-	-	-	-
28	58	E	DSO	DSO	-	+	+	+	-
29	47	E	DSO	DSO	-	+	-	+	-
30	31	K	DSO	DSO	-	+	-	+	-
31	57	E	TO	TO	+	-	-	-	-
32	50	E	DSO	DSO	-	+	-	+	T.Rubrum
33	46	E	DSO	DSO	-	+	+	+	-
34	66	E	DSO	DSO	-	+	+	+	T. Rubrum
35	43	E	DSO	DSO	-	-	+	+	-
36	54	K	DSO	DSO	-	+	-	+	-
37	45	E	DSO	DSO	-	-	+	+	-
38	61	E	TO	TO	+	-	-	-	-
39	56	K	DSO	TO	+	-	-	-	-
40	44	E	DSO	DSO	-	+	+	+	-
41	57	E	DSO	DSO	-	-	+	+	T.Rubrum
42	62	E	DSO	DSO	-	+	+	+	-
43	50	K	DSO	DSO	-	-	+	+	-
44	48	E	TO	TO	+	-	-	-	-
45	52	E	DSO	DSO	-	+	-	+	T.Rubrum
46	31	E	DSO	DSO	-	-	+	+	-
47	59	K	DSO	DSO	-	+	+	-	-
48	38	E	DSO	DSO	-	-	+	+	-
49	29	K	TO	TO	+	-	-	-	-
50	65	K	DSO	DSO	-	+	+	+	T.Rubrum

DISCUSSION

Mycological diagnosis is still the gold standard for the diagnosis of onychomycosis but it involves a number of technical problems. Trained staff and equipment needs (microscope, KOH solution, etc.) and the times required for the preparation are major challenges in KOH examination. Another disadvantage of the mycology is that the result can be approved within 3-4 weeks if the fungal culture is desired. All of these conditions make the mycological diagnosis impractical in onychomycosis.

DSO and TO are two commonly encountered cases in adult patients and composes of a significant part of the nail related complaints. A significant number of dermatologists make a "probable" diagnosis with clinical presentation and they prescribe some antifungal agents without mycological confirmation (8).

Dermoscopy is a very practical and cost effective diagnostic tool that is becoming increasingly used in the diagnosis of nail diseases.

There are a few literature on the use of dermatoscopy in cases of onychomycosis (9-11)

Piraccini et al identified specific dermatoscopic findings in distal subungual onychomycosis and traumatic onycholysis. These findings are longitudinal stria and spike findings for distal subungual onychomycosis and linear edge for traumatic onycholysis (9). In our study, 50 patients which have preliminary diagnosis of distal subungual onycholysis or traumatic onycholysis of the big toe nail were evaluated in term of these previously described findings.

In our study, the sensitivity and specificity of the longitudinal striae for diagnosis of DSO were 75.2% and 88.2%, respectively. In the study of Piraccini et al., the sensitivity and specificity of the same finding were 86.5% and 100%, respectively.

In diagnosis of DSO, sensitivity and specificity of the spike finding were 57.5% and 94.1%, respectively. In the study of Piraccini et al., the sensitivity and specificity of this finding were 100%.

In our study, sensitivity and specificity of the linear edges for diagnosis of TO were 94.1% and 96.9%, respectively. In the study of Piraccini et al., the sensitivity and specificity of the same parameter were found to be 100%.

In a recent study, Chetana et al revealed that the longitudinal striae, spikes, and jagged patterns are statistically significant findings of distal and lateral subungual onychomycosis (10).

In the study of Kaynak et al, the longitudinal stria and

spike findings were demonstrated in 79.5% and 63.4% of confirmed DLSO cases, respectively.

And finally Nargis et al. who dermoscopically evaluated mycologically confirmed 60 cases of confirmed DLSO, stated that the longitudinal stria and jagged edge findings were observed in all cases (12).

CONCLUSION

Along with recent studies, our study shows that dermoscopy is a very useful, effective, practical and inexpensive diagnostic method for distal subungual onychomycosis. Dermoscopic examination can prevent time loss and reduce cost in many cases of DSO by reducing mycological examinations.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: Local ethic committee of Ataturk University, Faculty of medicine approved the study.

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